ATQ150 SERIES
9-75VDC INPUT / 150W OUTPUT
8:1 ISOLATED DC-DC CONVERTER

Advanced Technology Applications Qualified

"**A**chieve **T**otal **A**ssurance and **Q**uality in Power."

EFFICIENT - INNOVATIVE - VERSATILE

The ATQ150 Series provides a high-performance solution for demanding power conversion applications. With its 150-Watt output power, 9 - 75VDC input voltage and 8:1 input voltage range, this isolated DC-DC converter ensures reliable operation and high efficiency. It is engineered for robustness supports a wide operating temperature range and complies with industrial standards.

I. *Compliant with MIL-STD-1275(*) with external components*
II. *Compliant with MIL-STD-704(*) with external components*

NOTE:
* Suitable for COTS use. If the product is intended to be used with a military system, it must be tested in the internal structure of a system subject to military tests. ATAQ does not guarantee the use of this product in military and medical products.

FEATURES TABLE

Feature	Specification	Details
Ultra-Wide Input Voltage:	9 – 75 VDC	- Over-Temperature, Over-Current, Short-Circuit, Over-Voltage, Under-Voltage Lockout protection.
Efficiency:	Up to 90%	- Turned off by the ON/OFF input.
Switching Frequency:	Fixed, 200kHz	- Output voltage trim range of ±10%.
Output Regulation:	Regulated Outputs	- Remote sense for the output voltage.
Remote On/Off:	Yes	- 2.40" L x 2.28" W x 0.50" H (61.0mm L x 57.9mm W x 12.7mm H)
Protection:	Fully (OTP/OCP/OVP/UVLO)	- Complies with safety standards for reliable operation.
Isolation Voltage:	1500Vdc I/O Isolation	
Operating Case Temperature:	-40°C to +100°C	
Package Size:	Half Brick Size	
Safety Approval:	UL60950-1 2nd Edition	

MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT		INPUT CURRENT		% EFF.	CAPACITOR LOAD MAX.
			MIN.	MAX.	NO LOAD	FULL LOAD	Nominal Input Voltage 36VDC	
ATQ150-WH36S12	9-75 VDC	12 VDC	0 mA	12.50 A	60 mA	4.66 A	89.5 (1)	5000µF (2)

NOTE:

1. The output terminal of 24Vout models required a minimum capacitor 100uF to maintain specified regulation
2. The input external capacitor recommends to parallel with 330uF ESR<0.5Ω to reduce the input ripple voltage

PART NUMBER

Series	Input Voltage Range	Dimension	Nominal Input Voltage	Number of Outputs		Nominal Output Voltage	Remote On/Off Logic	
	X	X	XX	X		XX	X	
ATQ150-	**W** **W**ide Input Voltage Range (9-75 VDC)	**H** (**H**alf Brick)	**36** (**36** VDC)	**S**ingle **D**ouble	**S** **D**	**12** (**12** VDC)	High **L**ow	- **L**

TECHNICAL SPECIFICATIONS

(All specifications are typical at nominal input, full load at 25°C unless otherwise noted.)

ABSOLUTE MAXIMUM RATINGS:

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Input Voltage	Continuous	12Vo	-0.3		75	Vdc
Input Surge Voltage	100ms max.	12Vo			100	Vdc
Input Surge Voltage	100ms max.	12Vo			80	Vdc
Operating Case Temperature	At the Center Part of Base Plate	12Vo	-40		100	°C
Storage Temperature		12Vo	-55		105	°C

INPUT CHARACTERISTICS:

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Operating Input Voltage		12Vo	9	36	75	Vdc
Input Under Voltage Lockout						
Turn-On Voltage Threshold		12Vo	8.5	9.0	9.5	Vdc
Turn-Off Voltage Threshold		12Vo	7.5	8.0	8.5	Vdc
ON/OFF control, positive remote ON/OFF logic	Logic low (Module OFF) Logic high (Module ON)	12Vo	0 3.5V or open circuit		1.2 75	Vdc
Lockout Hysteresis Voltage		12Vo	1			Vdc
Maximum Input Current	V_{in}=9V, Full Load.	12Vo	20			A
No-Load Input Current	V_{in}=36V, Io=0A		20			mA
Input Filter	LC filter	12Vo				
Recommended Input Fuse	Fast acting type	12Vo	30			A
Input Capacitance (External)	< 0.5Ω ESR	12Vo	330			uF
Switching frequency		12Vo	200			kHz

OUTPUT CHARACTERISTICS:

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Voltage Set Point Accuracy	V_{in}=36V, Full Load, Tc=25°C	12Vo	-1.0		+1.0	%
Output Voltage Regulation						
Load Regulation	Full Load to No Load	12Vo			±0.2	%
Line Regulation	V_{in}=High Line to Low Line, Full Load	12Vo			±0.2	%
Output Voltage Ripple and Noise (5Hz to 20MHz bandwidth)						
Peak-to-Peak	Full load, 10uF tantalum and 1.0uF ceramic capacitors	12Vo			120	mV
RMS		12Vo			60	mV
Output Current Range	V_{in}= 9 to 75V	0 – 6.25				A
Over Current Protection	<90% Vo	12Vo	105	160	200	%
Short Circuit Protection	Hiccup Mode / Auto Recovery	12Vo	Continuous, Auto Recovery			
External Load Capacitance	Full load (Constant resistive load)	5000				uF
Output Voltage Trim Range	Po≦max rated power, Io ≦ Io_max	12Vo	-10		+10	%
Start-up time		12Vo	110			ms

EFFICIENCY:

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
100% Load	Vin=24V	up to 90%				%

GENERAL SPECIFICATIONS:

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
MTBF	I_O=100% of Io_max; MIL-HDBK-217F_Notice 1, GB, 25°C	12Vo		800		K hours
Weight		12Vo		109		Grams
Isolation resistance	10^7 ohms, min.					
Isolation capacitance (Typical)	Input to Output	3500				pF
	Input to Case (Base Plate)	1000				
	Output to Case (Base Plate)	1000				
Isolation voltage	Input / Output : 1500VDC min. (1 minute) Input / Case : 1500VDC min. Output / Case : 1500VDC min.					
Case Material	Plastic, DAP, UL 94V-0					
Dimensions	57.9 x 61.0 x 12.7 mm					
Base plate Material	Aluminum					
Potting Material	UL 94V-0					
Pin Material	Base: Copper Plating: Nickel with Matte Tin					
Shock/Vibration	MIL-STD-810F Compliant					
Humidity	95% RH max. non-condensing					
Altitude	2000m Operating Altitude, 12000m Transport Altitude					
Thermal Shock	MIL-STD-810F					
EMI	Meets EN55032 (with external filter)					Class A

ELECTRICAL BLOCK DIAGRAM:

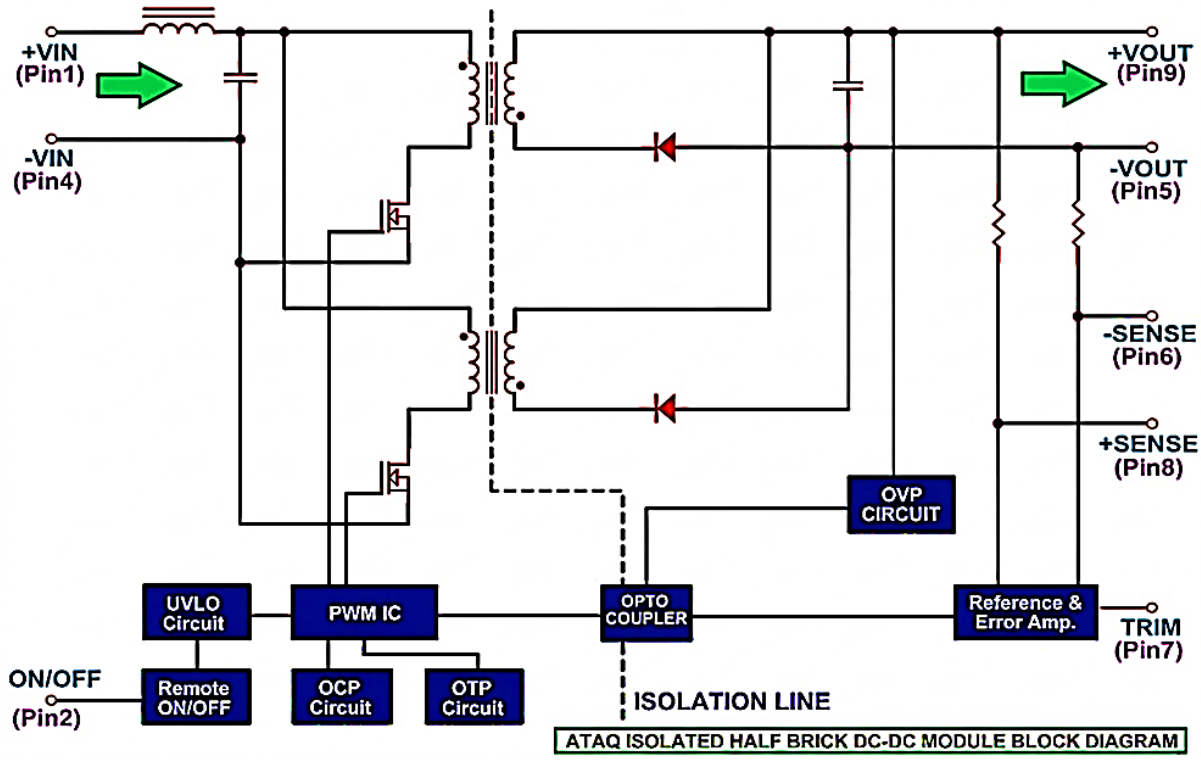


Figure-1

STANDARDS COMPLIANCE						
MIL-STD-1275D						
No	**Parameters**	**Min**	**Typ**	**Max**	**Unit**	**Status**
1	5.1.3.1 Steady-State Voltage	25	-	30	VDC	Passed
2	5.1.3.2 Ripple	-	-	2	VDC	Passed
3	5.1.3.3 Surges	28	-	40	VDC	Passed
4	5.1.4.1 Steady-State Voltage	23	-	33	VDC	Passed
5	5.1.4.2 Ripple	-	-	7	VDC	Passed
MIL-HDBK-704-8						
No	**Parameters**	**Min**	**Typ**	**Max**	**Unit**	**Status**
1	LDC101	-	-	-	-	Passed
2	LDC102	16	28	40	VDC	Passed
3	LDC105	28	-	100	VDC	Passed
4	LDC201	-	-	-	-	Passed
5	LDC301-704E	20	-	31,5	VDC	Passed
6	LDC302-704E	22	-	50	VDC	Passed
7	LDC401-704E	18	-	29	VDC	Passed
8	LDC501	12	-	29	VDC	Passed
9	LDC601	0	-	28	VDC	Passed

Table-1: *MIL-STD-1275 and MIL-STD-704 baseline test results applied with external components (TVS+EMC filters).*

CHARACTERISTIC CURVE & GRAPHS

POWER DERATING CURVE:

Note: Figure 1 shows the results of thermal tests for different heatsinks.
Heatsink – 1 / VHS-95 (517-95AB) /, **Heatsink – 2** / VHS-45 (528-45AB), **Heatsink – 3** / M-C308

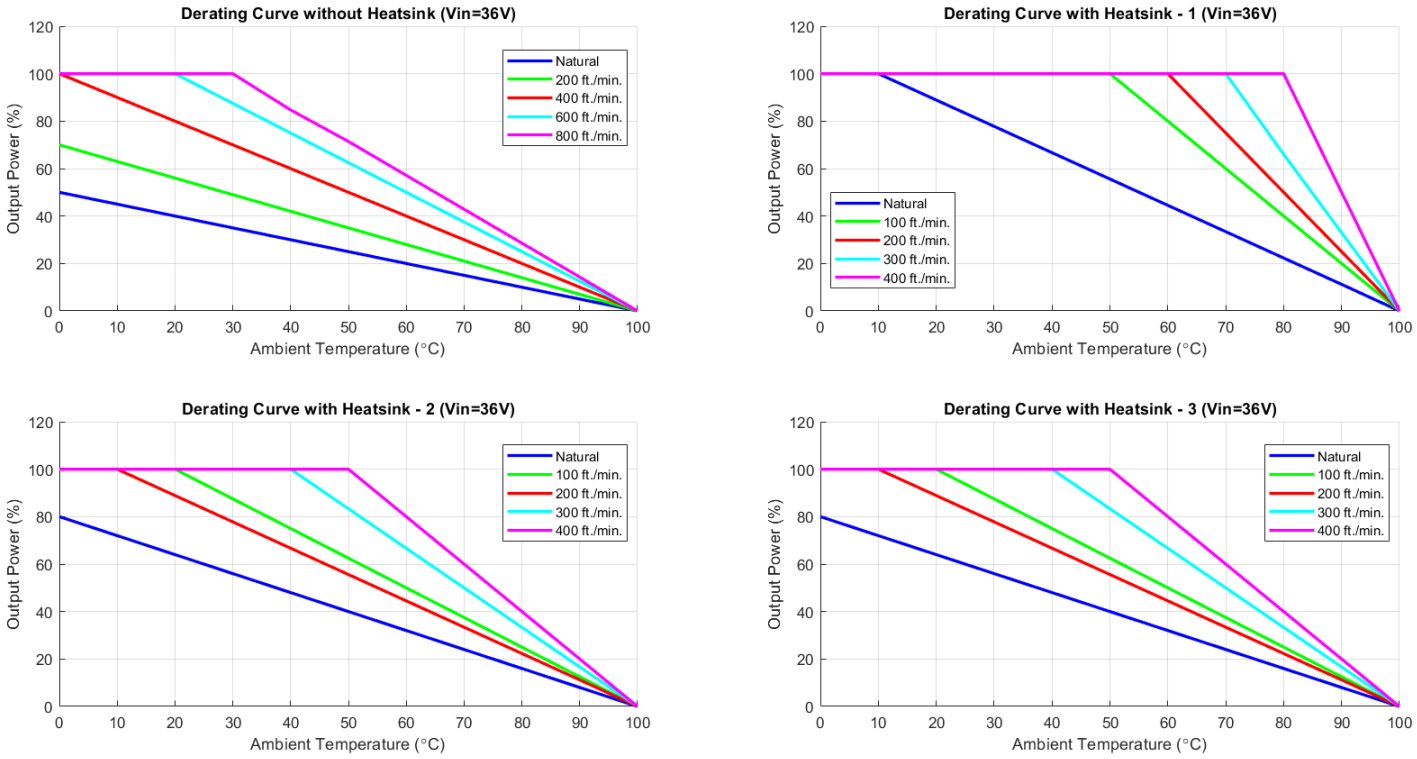


Figure-2

PERFORMANS INFO & DATA

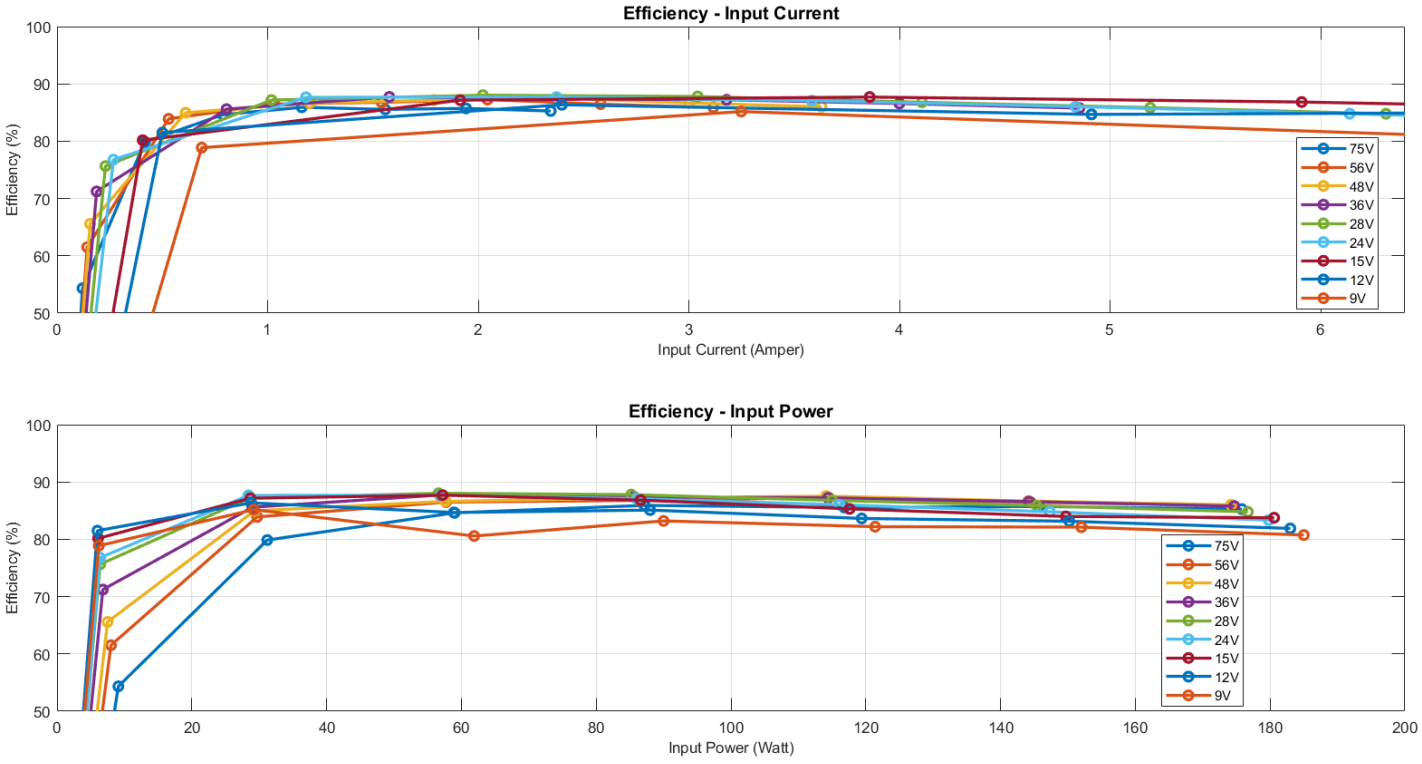


Figure-3

Note: The Efficiency-Output Power graph provides a clearer view of the relationship between output power and efficiency for each load value. (Figure-3 / Efficiency – Output Power Graph)

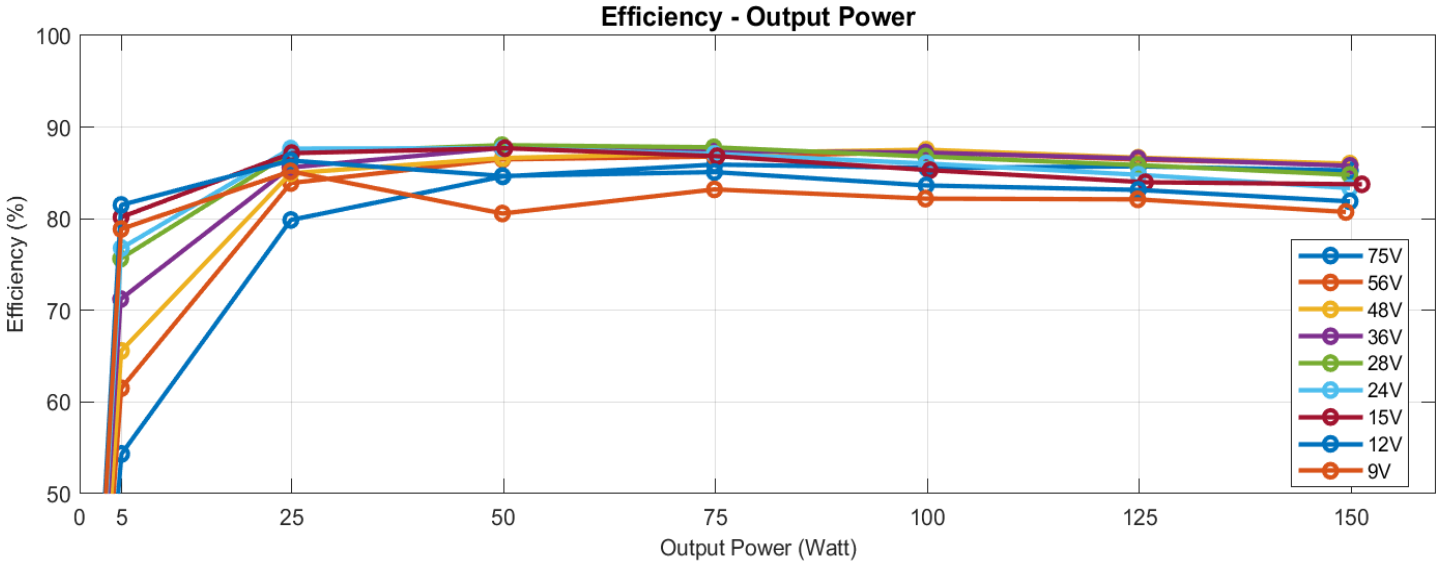


Figure-4

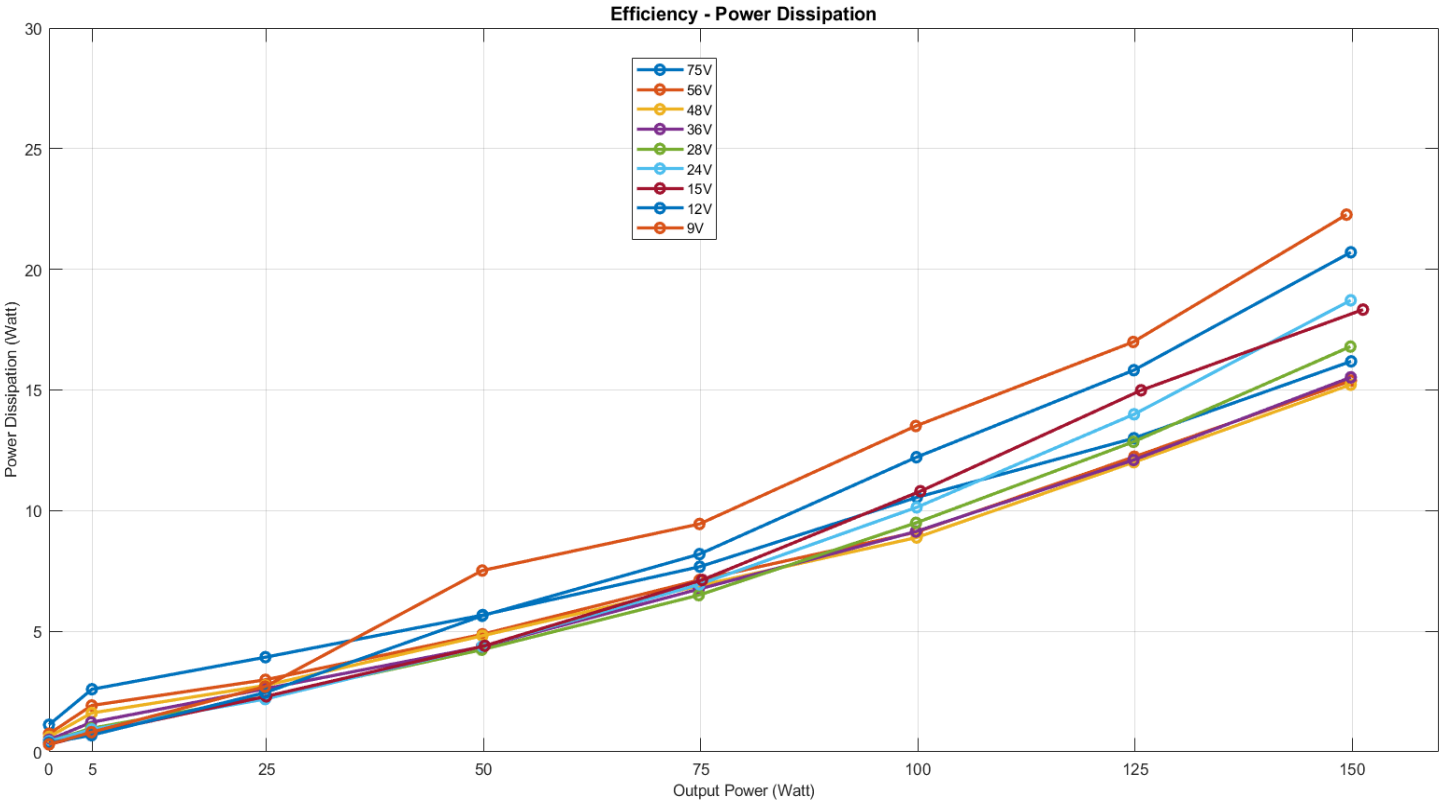


Figure-5

OUTPUT VOLTAGE ADJUSTMENT:

The Trim input permits the user to adjust the output voltage up or down 10%. This is accomplished by connecting an external resistor between the Trim pin and either the Vo (+) pin or the Vo(-) pin (TRIM pin). Please see Figure.

Only one of the trim-up or trim-down resistors should be used to increase or decrease the output voltage.

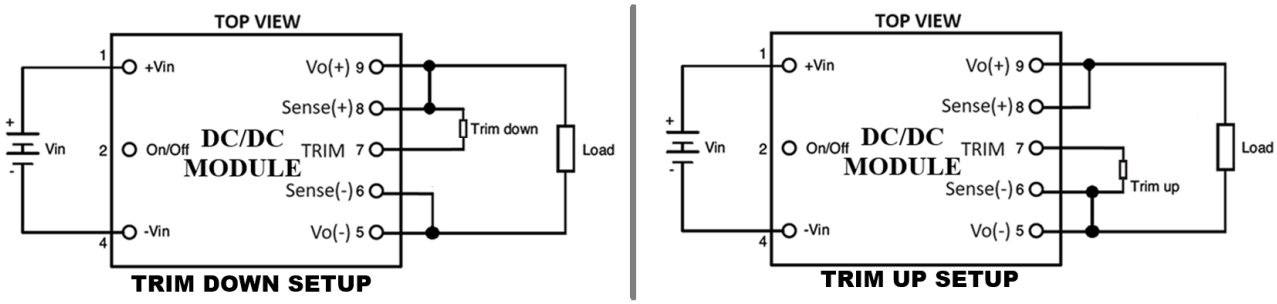


Figure-6

The Trim pin should be left open if trimming is not being used. Connecting an external resistor (Rtrim-down) between the Trim pin and the Vout(+) (or Sense(+)) pin decreases the output voltage.

The following equation determines the required external resistor value to obtain a down percentage output voltage change of Δ%.

Vout=12V:

$$Rtrim\_down = 20 * \frac{(Vo,set - \Delta\% * Vo,set - 1.24)}{\Delta\% * Vo,set} - 100K\Omega$$

Where

For example, to trim-down the output voltage of 12V module (ATQ150-WH36S12) by 5% to 11.4V, Rtrim-down is calculated as follow:

Δ %=5%

$$Rtrim\_down = 20 * \frac{(\mathbf{12} - \mathbf{5}\% * \mathbf{12} - 1.24)}{\mathbf{5}\% * \mathbf{12}} - 100K\Omega$$

Rtrim_down = 238.7 *k*Ω

Connecting an external resistor (Rtrim-up) between the Trim pin and the Vout (-) (or Sense (-)) pin increases the output voltage. The following equations determine the required external resistor value to obtain an up percentage output voltage change of Δ%.

Vout=12V:

$$Rtrim\_up = 20 * \frac{(1.24 - \frac{0.46 * 100}{100 + 4.3})}{\Delta\% * Vo,set} - \frac{4.3 * 100}{100 + 4.3} K\Omega$$

Where

$$V_{out} = V_{o,set}, \Delta\% = \left(\frac{V_{desired} - V_{o,set}}{V_{o,set}} \right) \times 100$$

For example, to trim-up the output voltage of 12V module (ATQ150-WH36S12) by 5% to 12.6V, Rtrim-up is calculated as follow:

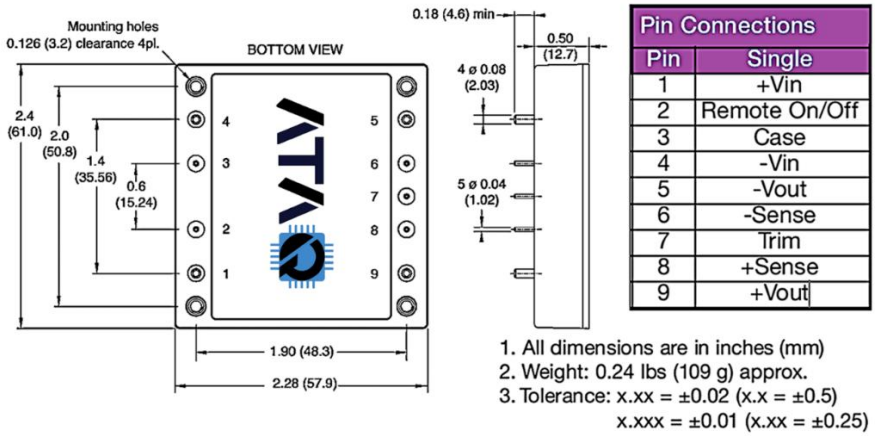
$\Delta\%=5\%$

$$Rtrim\_up = 20*\frac{(1.24-\frac{0.46*100}{100+4.3})}{5\%*12}-\frac{4.3*100}{100+4.3}K\Omega$$

Rtrim_up = 22.50 kΩ

The output voltage on 12V models is adjustable within the range of +10% to −10%.

MECHANICAL SPECIFICATION:



Pin Connections	
Pin	Single
1	+Vin
2	Remote On/Off
3	Case
4	-Vin
5	-Vout
6	-Sense
7	Trim
8	+Sense
9	+Vout

Figure-7

Figure-8

PACKAGING:

Due to ATAQ' s value-added services, the packaging type may change when purchasing quantities below the standard package.

Figure-9

For all other features and applications, please refer to the ATQ150-WH series application notes document.

Contact ATAQ for further information and to order.